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THE ACCEPTANCE OF PRODUCT RECOMMENDATIONS FROM WEB-BASED WORD-OF-MOUTH SYSTEMS: EFFECTS OF INFORMATION, INFORMANT, AND SYSTEM CHARACTERISTICS

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Abstract

The study examines the consumer's acceptance of product recommendations from web-based word-of-mouth systems (WWOMS). Conceptualizing WWOMS as an informant-mediated persuasive environment that comprises many communication elements and drawing on the accessibility-diagnosticity model and the theories of informant-mediated communications, this study identifies the critical roles of WWOMS information diagnosticity and WWOMS informant expertise and trustworthiness and their antecedents in influencing the consumer's acceptance/rejection of WWOMS recommendations. It also examines the effects of unique WWOMS mechanisms such as helpfulness indicators and informant status indicators. An experiment was carried out to test the propositions empirically. Theoretically, this study fills the current knowledge void regarding the consumer's processing and usage of information and recommendation from WWOMS. It also enhances the word-of-mouth literature by contributing new insights of electronic WOM. Practically, the paper sheds light on how to design WWOMS to promote recommendation acceptance and electronic transactions.

Keywords: Electronic word-of-mouth, diagnosticity, expertise, trustworthiness, informant, recommendation acceptance

Introduction

Word-of-mouth (WOM) communications have long been an important marketing phenomenon. Recently, electronic word-of-mouth (EWOM) is developing rapidly, thanks to the penetration of computer networks into business and social communications. EWOM extends WOM communications that have traditionally embedded in an individual's direct social network to the Internet (Dellarocas 2003). The major technological underpinning of EWOM is various word-of-mouth systems (WWOMS), defined as web-based information systems that allow consumers to post consumption information in the form of product reviews electronically on the Internet. The impacts of EWOM on both online and offline consumption behavior are well evident (DoubleClick 2004, Godes and Mayzlin 2004, Riller 1999). To leverage on the ability of EWOM in alleviating major constraints caused by the lack of contact in online transactions, practitioners such as eBay, ePinions.com, Amazon.com, Venere.com, etc. have notably incorporated WWOMS into their electronic commerce platforms.

Current studies related to WWOMS focus mainly on its impacts on trust building between exchange partners and on overall sales (Ba and Pavlou 2003, Godes and Mayzlin 2004) and are far from showing the full-range influence of WWOMS on consumer behavior. Product information presented in WWOMS contains descriptions of product features and the associated feelings that unfold in the process of actual consumer-product interactions. Conceivably, it has the potential to help consumers develop in-depth understanding of products and services, formulate consideration sets, and eventually make consumption decisions. However, systematic investigation on how consumers process product information from WWOMS has been scarce. Such a limitation motivates this study.

Viewing consumers' usage of product information from WWOMS as an informant-mediated indirect product experience process, this study examines how the characteristics of both WWOMS information and informant and the WWOMS artifacts affect consumers' acceptance of WWOMS recommendations.

Theoretical Development

The consumers who access product information from WWOMS to develop product knowledge are termed as information seekers. WWOMS attempt to influence information seekers' decision making by providing product information submitted by other consumers. These systems represent an informant-mediated persuasive environment that comprises many communication elements. Specifically, in a typical WWOMS such as ePinions.com and Amazon.com, the communication elements include (1) the WWOM product information in the form of product reviews and evaluations, (2) the WWOM informant, i.e., the review and evaluation provider, (3) the system indicator reflecting the usefulness of the product information based on the evaluations from the consumers who have read and used the product information, and, (4) the system indicator reflecting informants' status and expertise. Figure 1 presents an example of some WWOMS communication elements. Our research model (Figure 2) proposes how the above communication elements influence consumers' acceptance of WWOMS recommendations. We drew on the accessibility-diagnosticity theory (Herr et al. 1991) and the theories of informant-mediated communication (O'Keefe 2002) to develop the research model.

WWOM Information and Informant Characteristics and Recommendation Acceptance

The Effect of Information Diagnosticity

Prior to making consumption decision, consumers often need to collect certain amounts of product information to develop product knowledge and form product attitude. However, the amount of product information available is often beyond the consumer's cognitive processing ability. Therefore, product information acquired from various sources will have differential influences in the consumer's decision making process. The accessibility-diagnosticity model suggests that the influence weight of a piece of product information depends on its accessibility and diagnosticity (Herr et al. 1991).

Accessibility effect emerges when the product information significantly shapes product attitude because it is easy to retrieve from the consumer's memory. The manner of product presentation has been identified as a significant factor affecting information accessibility. Herr et al. (1991) demonstrated that vividly presented information is inherently interesting, attention drawing, thought provoking and hence tends to register a memory that will be easily activated.

Consequently, vivid information, opposed to pallid information, will be more accessible and weighed more heavily when consumers form attitudes toward products.

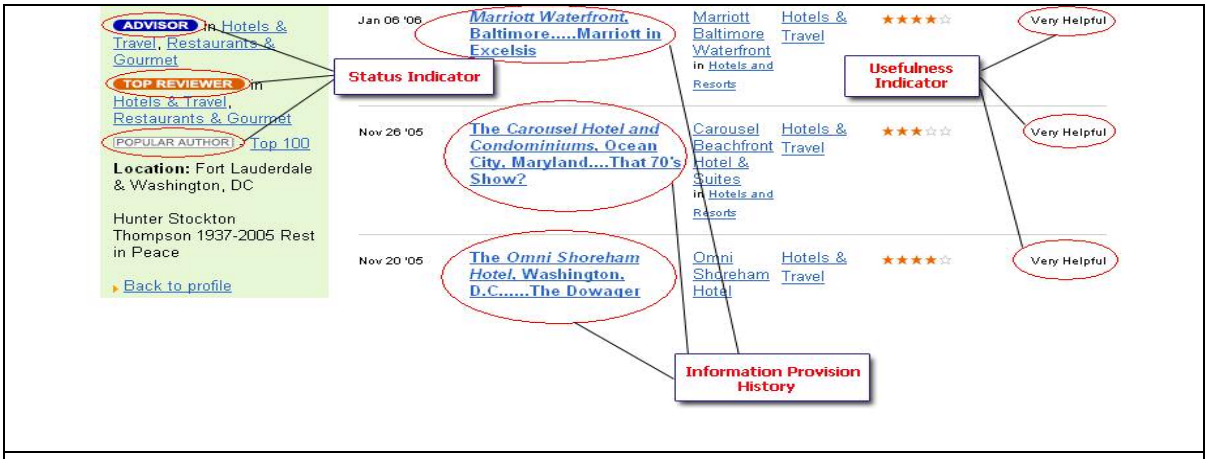

Figure 1. An Example of WWOM Context in ePinions.com

Information diagnosticity effect occurs when the consumer feels that the presented product information allows for a better assessment of the product and uses the information as an input to form product attitude. This study focuses on diagnosticity effect and controls accessibility by maintaining a text-based product information presentation on the web. This focus is consistent with current practice of WWOMS, where the most common presentation manner of product information is still text-based, resulting in a pallid communication setting.

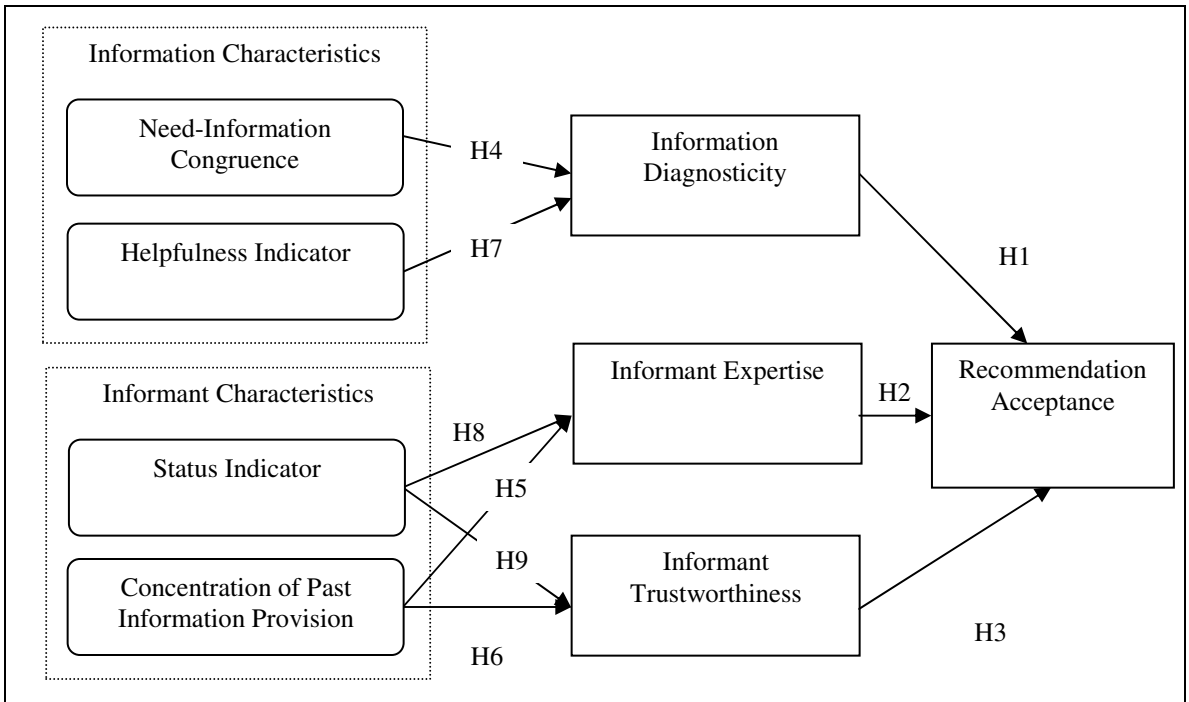

Figure 2. Research Model

Information diagnosticity is defined as the perceived ability of communicated product information to predict actual product performance. It is an important attribute of product information. Kempt and Smith (1998), Jiang and Benbasat (2005) and Suh and Lee (2005) explicate the effect of diagnosticity of consumer-product interactions on product learning and consumption decision in product trial process and virtual shopping environments.

WWOMS, bridging the interaction gap between information seekers and products/services that cannot be virtually presented in electronic settings due to constraints in product characteristics and vendor computing capabilities, allows informants to share the information regarding their interactions with products with information seekers. Although unable to interact with products directly or virtually, information seekers still can understand product features and performance as well as perceive the feelings the product evokes through reading WWOMS product information. The perceived ability of the product information from WWOMS to help evaluate the product of interest is expected to determine whether the consumer would rely on the recommendation. Extending the finding regarding the significant effect of diagnositicity on product attitude from the studies on direct and virtual product interactions, we conjecture a similar effect of information diagnosticity in the WWOMS context.

> **H1**: Information diagnosticity of the product information from WWOMS will have a positive effect on the acceptance of the WWOMS recommendation.

Effects of Informant Expertise and Trustworthiness

In informant-mediated product communications, the informant credibility is a key factor that influences the acceptance of the informant's opinion (Gershoff, Mukherjee, and Mukhopadhyay 2003, Grewal et al 1994, O'Keefe 2002, West and Broniarczyk 1998, White 2005). Informant credibility encompasses two dimensions – the expertise and the trustworthiness (O'Keefe 2002). The informant's expertise reflects the extent to which the communicator is in a position to know the truth. An expert informant is expected to have needed knowledge background that enables her to develop an accurate product evaluation formula, give a thorough examination on the product, and provide objective illustration of the product and useful recommendation. The informant's trustworthiness assesses whether the communicator will likely be inclined to tell the truth as she sees it (O'Keefe 2002). A trustworthy informant is expected to have no intention to mislead the information recipient and therefore tell the truth of a product. When both expertise and trustworthiness are present, the informant's opinion will be highly relied upon. Substantial empirical studies have provided evidence to support the effects of expertise and trustworthiness on information acceptance in communications that involve informants (e.g. Andrews and Shimp 1990).

The informant's expertise and trustworthiness are expected to be especially important for an information seeker who relies on the product experience information from WWOMS for consumption decision due to the lack of control of information quality in WWOMS. Generally, every one can provide information to WWOMS after registration. The openness of WWOMS gives rise to some concerns about the accuracy and validity of the information from WWOMS.

First, the informants' expertise regarding the product being reviewed may have a close relationship with knowledge bias (Eagly, Wood, and Chaiken 1978). Writing product information for WWOMS will activate the informant's knowledge structure. Experienced informants tend to have a well established knowledge structure of a category of products that comprehensively covers the important features and attributes that may be of interest to a typical consumer (Murphy and Wright 1984). Product information from these experienced informants hence has less neglect of product features and attributes than that provided by novice informants who lack a grasp of the essential attribute structure of the product. The information seeker thus needs to identify an informant's expertise before deciding whether to embrace his recommendation. Second, the absence of informant identity verification and the powerfulness of WWOMS information in guiding consumption may entice merchants and vendors to manipulate the system to mislead consumers (Dellarocas 2004, Miller, Resnick, and Zeckhauser 2005). Therefore, it is crucial to ensure that the information in the WWOMS is from a trustworthy informant.

The above concerns highlight that the information seeker needs to analyze the informant's expertise and trustworthiness before accepting recommendations presented in WWOMS. When the information seeker perceives the informant to be credible, she will devote significant cognitive resources to process the informant's product information and in the meantime generate little skepticism. Thus, the information from a trustworthy and knowledgeable informant is expected to shape the information seeker's attitude toward the product recommendation profoundly.

> **H2**: The perceived informant expertise will have a positive effect on the acceptance of the WWOMS recommendation.
>
> **H3**: The perceived informant trustworthiness will have a positive effect on the acceptance of the WWOMS recommendation.

The Antecedent of Information Diagnosticity – Need-Information Congruence

Consumptive behavior is guided by the desire to satisfy personal needs (Stanton and Lowenhar 1974). Prior to considering a product and searching for relevant information, the information seeker tends to have a cognitive structure arising from her consumptive needs. When evaluating a product, the information seeker relates the product information to personal needs cognitively. The performance of a product in the areas that pertain to the consumer's needs constitutes an important focus of attention when the consumer processes the product information. If the product information regarding the needs is available, the consumer would be able to evaluate the product as to whether it satisfies her needs. Thus the product information is diagnostic and poses low ambiguity. Contrarily, information diagnonsticity is low if the information does not contain any elaborations on the product's attributes that concern the consumer.

Consumers' needs are heterogeneous and there is possibly a mismatch in product needs between the informant and the information seeker. What a product concerns the information seeker most may not be among the important product features from the informant's perspective and thus may not be included in the product experience description that the informant submitted to the WWOMS. As diagnosticity assessment is task specific (Gershoff, et al. 2001), the product information that is unable to facilitate the consumer in gaining the needed knowledge would be deemed to be nondiagnosticity.

We expect that when the product information from WWOMS is congruent with the information seeker's informational needs, the seeker will perceive the information to be diagnostic and will be willing to take the recommendation. Conversely, the incongruence between the seeker's need and the WWOMS product information may result in low diagnosticity assessment and low recommendation acceptance.

> **H4**: WWOM information that is congruent with the consumer's informational needs will be perceived to have high information diagnosticity.

The Antecedent of Informant Expertise and Trustworthiness – Concentration of Information Provision History

Studies have identified a number of sources that information seekers may utilize to make expertise and trustworthiness assessments (Kang and Herr 2006). The most widely examined source is personal characteristics of the informant. These personal characteristics include factually demographic information such as age, profession, education, status, gender etc (O'Keefe 2002). When there is a lack of background information of the informant, information seekers may develop informant perceptions by assessing the past information provided by the informant (Ganzach 1994, Gershoff, Broniarczyk and West 2001). For instance, West and Broniarczyk (1998) found that the rating information from movie critics would be utilized differently depending on the perceived ability of the critics, which was affected by the variation in the critic's past ratings. Additionally, Gershoff, Mukherjee, and Mukhopadhyay (2003) demonstrated that the extremity and positivity (negativity) of the informant's past opinions would account for the variance in the consumer's perception of the informant's ability and acceptance of the informant's advice on new products.

In WWOMS consumers tend to form weak ties that would constrain their accessibility to each another's background. However, the WWOMS databases have the ability to identify and accumulate an informant's information contribution history, which is expected to assist the information seekers in gauging the informant's expertise and trustworthiness. Specifically, the focus of product information from an informant on a particular product category could indicate that the informant might be quite experienced and have an in-depth understanding of the product category, and thus low knowledge bias. Meanwhile, an informant's descriptions on different products of the same category could demonstrate she has no strong intention to promote a particular product, thus low reporting bias. Hence, we propose the following.

> **H5**: The concentration of an informant's information contribution history on the focal product category will increase the perceived informant expertise.
>
> **H6**: The concentration of an informant's information contribution history on the focal product category will increase the perceived informant trustworthiness.

Effects of WWOMS Decision Aid Indicators

In practice, WWOMS often deploy additional communication components to assist information seekers. One notable set of components involves various indicators pertinent to recommendations and informants. We focus on two types of decision aid indicators, namely information helpfulness and informant status, and conjecture that they also exert some direct influences on diagnosticity and credibility judgment and recommendation acceptance.

The helpfulness indicator presented along with the WWOMS recommendation represents an endorsement. The indicator may trigger the heuristic thinking that "as the product information is useful to other information seekers, it must be useful to me." Indeed, the heuristic rule could confirmed by the social influence theory (Asch 1966, Cialdini 1993), which predicts that people have the tendency to align their thoughts and behaviors with similar others. The information seeker would apply other consumers' opinions with regard to the product information to his/her own assessment of the product. Thus WWOMS information that is indicated as helpful by other consumers would be likely perceived diagnostic by the information seeker.

H7: The information helpfulness indicator in WWOMS will increase information diagnosticity.

Status indicators such as "product advisor" or "top reviewer" officially certify an informant's knowledge and achievements. Pavlou and Gefen (2004) suggest that institution-based recognition positively enhance e-commerce participants' perception of exchange partners. Status indicators could activate the information seeker's thinking that "since the informant is recognized by the system, he should be knowledgeable and reliable". Such thinking is expected to lead to high perceptions of expertise and trustworthiness. Hence we hypothesize,

H8: The informant status indicator in WWOMS will increase the perceived informant expertise.

H9: The informant status indicator in WWOMS will increase the perceived informant trustworthiness.

Research Methodology

Study Design and Manipulations

A 2 (need-information congruence) by 2 (concentration of information provision history) by 2 (helpfulness indicator) by 2 (status indicator) full factorial experiment was designed. The product used for empirical testing should satisfy the following three criteria. First, the product category should be relatively familiar to the subjects so that we can better capture how judgments are formed in a naturally occurring environment. Second, we would like to have a product for which consumers often turn to others for information and advice. Third, to ensure realism, we need a product whose information is often obtained through an online channel. We chose hotels as the study product.

Study subjects were told that they were going to travel to another country and would like to search hotels online. They were instructed to assume that they happened to come across a hotel from a web-based consumer recommendation portal. The portal, which incorporated a WWOMS, was developed for this study. The subjects were asked to evaluate the recommended hotel and decide whether to accept the recommendation. Along with the hotel recommendation, the WWOMS presented a consumer's review of the hotel and information provision history of the consumer. Manipulations of need-information congruence and the concentration of the informant's past WWOM information contribution on the focal product category were implemented here. Meanwhile, the system decision aid indicators were either presented or removed depending on the experimental treatments. Apart from the studied variables, the system presented a brief description and basic background information such as its service and facilities of the hotel. The description and background information were held constant across treatments.

Need-information Congruence was manipulated to reflect whether the product information presented by WWOMS addresses the information seeker's personal needs. In the experiment, the product information in WWOM, i.e., the hotel review posted by the informant, covered five attributes of the recommended hotel. The product information regarding three out of the five hotel attributes was consistent across treatments. The other two attributes were used for need-information congruence manipulation. The subjects were instructed that while considering a hotel they were particularly concerned with two features of the hotel, namely the safety of its surrounding environment and the ease of accessibility to public transportations. Under the congruence condition, the product information from the system contained illustrations of the product performance in the two areas that were important to the subjects. Under

the incongruence condition, the product information contained the product performance in another two areas irrelevant to the concerns of the subjects (i.e., decoration and amenities). Appendix 1 presents the manipulation of need-information congruence. A pretest was administered to 24 participants whose demographic backgrounds were similar to those of the subjects. The participants were equally distributed in two conditions. The participants were asked to evaluate how well the hotel review addressed their information need for hotel environment safety and for accessibility to public transportation. The two versions of the hotel review representing the need-information congruence manipulation yielded significantly different congruence values for both hotel environment safety and for accessibility to public transportation in ANOVA test ($F= 22.676$, $p < 0.01$ and $F= 21.909$, $p < 0.01$). Therefore, the two versions of the hotel reviews were used for the experiment.

Concentration of Information Provision History captures whether the past product information provided to WWOM by the informant focuses on the focal product category, i.e., hotel, or an irrelevant product category, which was chosen as movies in this study. Under the concentration condition, the system showed that the informant had provided 15 reviews for hotels in the country that the subjects would be visiting. Under the non-concentration condition, the system presented that the informant had only one review on hotel which was the one the subjects were viewing and 14 reviews on movies. Appendix 2 presents the screenshot of the manipulation of the concentration of information provision history.

There are two manipulation states for the i*nformation helpfulness indicator*, presence and absence. The helpfulness indicator which suggested the WWOMS recommendation helpful was displayed on the web page that recommended the hotel to the subjects for presence manipulation. There was no helpfulness indicator under the absence condition. Similarly, the *information status indicator* was manipulated as either presence or absence. "Top Reviewer" was displayed next to the informant's registration ID for the presence manipulation, but was removed for the absence manipulation. Appendix 3 presents the screenshots of the manipulations of information helpfulness and informant status indicators.

Construct Operationalization

The *information diagnosticity* reflects how well the product information from WWOMS conveys the product features from the information seeker's perspective. It was measured with a scale adapted from the widely used Kempf and Smith's diagnosticity scale (1998). The *informant expertise* reflects the consumer's perception of the informant's expertise and knowledge for conveying accurate product information. The *informant trustworthiness* reflects the consumer's trust on the informant for providing non-misleading and reliable product information. Both scales were taken from Ohanian (1990). The *acceptance of recommendation* describes the information seeker's willingness and intention to rely on the WWOMS recommendation and was measured with the scale adapted from Gershoff, Mukherjee, and Mukhopadhyay (2003). Table 1 lists the instruments used.

Control Variables

Personal behavior in the WWOMS context could be affected by the subjects' individual characteristics and WWOMS stimulus. Multiple methods were used to control for the effects of possible confounding variables and improve the internal validity of this study. Personal characteristics, including age, education background, and Internet usage and experience were controlled by assigning subjects randomly to the experimental treatments. Meanwhile, we captured these personal differences in the questionnaire and included these variables in data analysis. As the experiment task was related to hotel booking for an overseas trip, we also captured the subjects' experience with hotel booking and traveling as control variables.

Petty and Cacioppo (1986) suggest that the individual's information processing motivation may influence the extent to which cognitive resource is used for processing communicated information. To control the subjects' information processing motivations across different treatments, we tried to maintain the individuals' decision responsibility for hotel booking for the overseas travel at the same level. As personal decision responsibility is identified as a key determinant of information processing motivation (Petty and Cacioppo 1986), we expected that the same level of decision responsibility would induce a comparable level of information processing motivation. In the experiment, subjects were told they would be traveling with their friends and they assumed the task of finding a hotel for the trip and needed to explain to their friends about their choices. By instructing the subjects this way, we anticipated that subjects would have a relatively high level of information processing motivation and the variance in the cognitive resources allocated to processing WWOMS recommendations could be minimized.

Table 1. The Measurement Instruments			
Construct	Code	Wording	Source
Information Diagnosticity	DIAT1	The hotel review helped me to evaluate the hotel.	Kempf and Smith (1998)
	DIAT2	The hotel review familiarized me with the hotel in aspects that I am interested in.	
	DIAT3	The hotel review let me know the performance of the hotel in aspects that I am interested in.	
	DIAT4	The hotel review enabled me to directly evaluate if the hotel could meet my needs.	
Informant Trustworthiness	TRST1	The person who submitted the hotel review is reliable.	Ohanian (1990)
	TRST2	The person who submitted the hotel review is sincere.	
	TRST3	The person who submitted the hotel review is trustworthy.	
Informant Expertise	EXPT1	The person who submitted the hotel review is experienced.	
	EXPT2	The person who submitted the hotel review is knowledgeable.	
	EXPT3	The person who submitted the hotel review is qualified.	
Recommendation Acceptance	ACPT1	What is the likelihood for you to accept the recommendation of the hotel from the system? (not at all/very likely)	Gershoff, Mukherjee, and Mukhopadhyay (2003)
	ACPT2	What is the probability for you to follow the recommendation of the hotel from the system? (not at all/very probable)	
	ACPT3	How influential is the recommendation of the hotel from the system on your decision whether to choose this hotel? (not at all/very influential)	

Study Procedures

A total of 341 students from a large university participated in the study. The demographic profile of the subjects is presented in Table 2.

Table 2. Subject Profile		
Demographic Variables	Categories	Frequency (Percentage)
Gender	Male	183 (53.7)
	Female	158 (46.3)
Education	1st year	98 (28.7)
	2nd year	104 (30.5)
	3rd year	99 (29.0)
	Honors year	36 (10.6)
	Postgraduate	4 (1.2)
Age	19 and below	53 (15.5)
	20-24	274 (80.4)
	25-29	14 (4.1)
Major	Arts and social science	32 (9.4)
	Business	59 (17.3)
	Computing	91 (26.7)
	Engineering	89 (26.1)
	Law	2 (0.6)
	Medicine	6 (1.8)
	Science	55 (16.1)
	Design and Environment	7 (2.1)
No. of Internet Purchase in the Past 6 Months	Never	153 (44.9)
	Below 10	154 (45.2)
	10-29	20 (5.9)
	30-49	4 (1.2)
	50 and above	10 (2.9)

Upon arriving at the experiment venue, the subjects were given a brief introduction of the study. They were told that the study purpose was to explore how a consumer uses Internet information for shopping and the specific investigation focus on WWOMS product information, the informant, and WWOMS mechanisms was not mentioned to minimize the demand effect and to increase study validity. After completing an online pre-experiment questionnaire containing questions on the subjects' demographic information, the subjects were randomly directed to the experimental web pages that incorporated various experimental manipulations. After their self-paced exploration of the web pages, the subjects were required to report their acceptance decisions with regard to the recommendation and assessments of WWOMS information and informant. We measured the dependent variable prior to information and informant assessments so as to minimize the demand effect.

Data Analysis and Results

Manipulation and Control Checks

Control checks on the subjects' gender, age, Internet usage, majors and online purchase history were performed to confirm that they were randomly assigned to study conditions. A multivariate analysis of variance (MANOVA) test confirmed that the random assignment of subjects to the sixteen experimental conditions was successful. There were no significant differences in gender ($F=1.311$, $p=0.286$), age ($F=0.867$, $p=0.534$), NFC ($F=1.514$, $p=0.102$), Internet usage ($F=0.586$, $p=0.625$), major ($F=0.302$, $p=0.804$) and online purchase history ($F=0.470$, $p=0.704$) among the sixteen experimental conditions.

As the manipulation check on need-information congruence was performed in the pretest, the experiment questionnaire contained manipulation check questions for the deployment of the two systems decision aid indicators only. Subjects were asked to answer four questions, including "was there any system indicator on the helpfulness of the hotel review," "the customer hotel review was indicated to be very helpful by the system," "was there any indicator of the status of the customer who had submitted the hotel review?", and "the person who had submitted the hotel review was indicated as Top Review in the system". The answers to these questions were used to filter out the subjects who did not perceive the treatments as intended. 11 subjected were dropped for providing wrong answers.

Table 3. Subject Distribution

Congruence	Concentration	HI	SI	Size
Yes	Yes	Yes	Yes	20
Yes	Yes	Yes	No	20
Yes	Yes	No	Yes	19
Yes	Yes	No	No	19
No	Yes	Yes	Yes	20
No	Yes	Yes	No	18
No	Yes	No	Yes	21
No	Yes	No	No	21
Yes	No	Yes	Yes	20
Yes	No	Yes	No	20
Yes	No	No	Yes	20
Yes	No	No	No	21
No	No	Yes	Yes	20
No	No	Yes	No	19
No	No	No	Yes	21
No	No	No	No	20

The click stream data of the subjects was also logged to test whether they had visited the web pages that contained the treatments. 7 subjects were dropped because they had not visited the hotel reviewer's profile page which contained the manipulation of the concentration of information provision and 4 subjects were removed for not having accessed the hotel review page which contained the manipulation of need-information congruence.

The data of 319 subjects entered the subsequent analysis. The subject distribution is presented in Table 3. As no significant effects of the control variables on WWOMS recommendation acceptance were detected, the subsequent data analyses focus on the theoretical constructs and model only.

Assessment of the Measurement Instruments

Exploratory factor analysis was performed on measurement instruments. The factors were detected using principal component analysis with varimax rotation. The results (Table 4) indicate that four factors emerged with eigenvalues greater than 1.0. These factors were consistent with the intended constructs.

Instrument reliability was determined with the Cronbach's alpha values (Table 4). All instruments exhibited satisfactory reliability, exceeding the threshold 0.707 (Nunnally 1978). Convergent validity was assessed with construct composite reliability and the average variance extracted by each construct. Nunnally's 0.707 (1978) is the cut-off value for construct composite reliability. Fornell and Larcker (1981) recommended that the average variance extracted by each construct should be greater than 0.5. All measurement instruments met the thresholds (Table 4).

Table 4: Statistics for Measurement Instrument Assessment

	Factors				Reliability	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
	1	2	3	4				
ACPT1	**.813**	.310	.100	.054	0.783	0.898	0.923	0.772
ACPT2	**.870**	.239	.014	.108	0.855			
ACPT3	**.719**	.302	.092	.205	0.754			
DIAT1	.333	**.610**	.138	.293	0.746	0.846	0.903	0.700
DIAT2	.235	**.873**	.059	.044	0.780			
DIAT3	.245	**.860**	.002	.070	0.758			
DIAT4	.232	**.760**	.202	.111	0.766			
TRST1	.198	.152	.221	**.650**	0.714	0.853	0.911	0.773
TRST2	.149	.120	.229	**.847**	0.730			
TRST3	.167	.069	.183	**.887**	0.782			
EXPT1	.049	.047	**.893**	.106	0.736	0.856	0.919	0.791
EXPT2	.195	.078	**.840**	.238	0.790			
EXPT3	.083	.230	**.709**	.361	0.706			

Discriminant validity was assessed with the criterion that each item should correlate more with other items of the same construct than with items of other constructs (Campbell and Fiske 1959, Cook and Campbell 1979). Discriminant validity is claimed when the average variances extracted by the items measuring the constructs are greater than the squared correlations between two construct (Fornell and Larcker 1981). As indicated in Table 5, in all cases, the correlations between two constructs (off-diagonal items) were less than the square root of the average variances extracted by the items measuring a construct (diagonal items). Hence, we believe that the measures discriminated adequately between the constructs.

Table 5: Discriminant Validity Assessment

Construct	DIAT	TRST	EXPT	ACPT
DIAT	**0.837**			
TRST	0.368	**0.879**		
EXPT	0.319	0.609	**0.889**	
ACPT	0.642	0.387	0.308	**0.879**

Hypothesis Testing

The adequate performance of the measurement instruments allowed us to analyze the proposed hypotheses. Given that both the dependent and the independent variables were all non-binary ones, path analysis with PLS-Graph3.0 was used. The results are depicted in Figure 4. Information diagnosticity (H1) and informant trustworthiness (H3) had significant positive effects on the acceptance of the WWOMS recommendation. The congruence between the information provided by WWOMS and the information seeker's personal needs as well as the helpfulness indicator heightened the information diagnosticity (H4&H7). The concentration of past information provision history enhanced both perceived expertise and perceived trustworthiness (H5&6).

To further explore the interplay between the perceived informant trustworthiness and expertise, a mediation test (Baron and Kenney 1986) was performed. There was a high correlation between TRST and EXPT ($r=0.606$, $p<0.001$). We compared the effect of the relative effect of EXPT and TRST on the acceptance of WWOMS recommendation. Both EXPT and TRST affected recommendation acceptance individually ($B=0.328$, $t=4.268$,

p<0.001 for EXPT vs. B=0.406, t=5.457, p=0.001). However, when both EXPT and TRST were regressed on recommendation acceptance, only TRST was significant (B=0.039, t=0.992 for EXPT, B=0.207, t=2.51, p<0.01 for TRST). Therefore, it is evident that the effect of informant expertise on recommendation acceptance was fully mediated by informant trustworthiness.

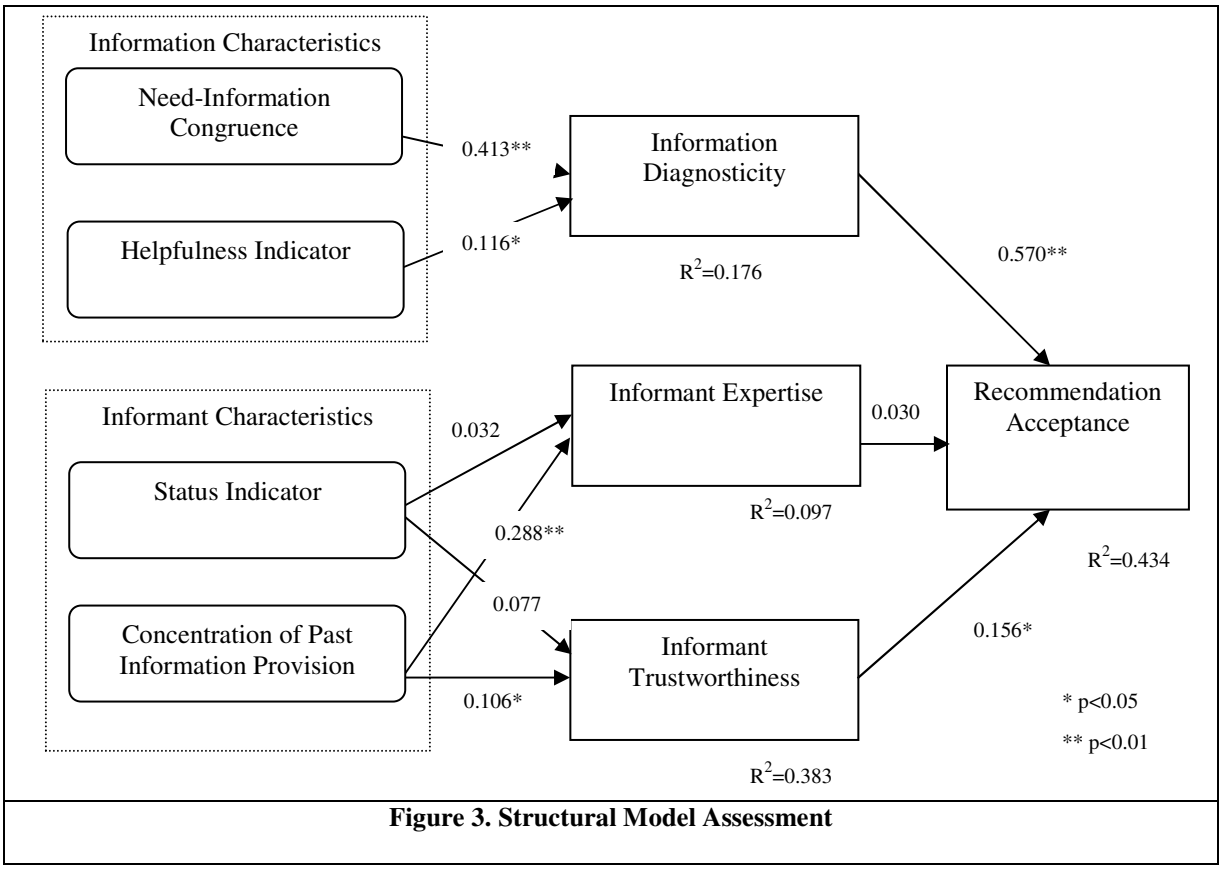

Figure 3. Structural Model Assessment

Discussions and Conclusion

The paper explores the information seeker's decision making process in the WWOMS recommendation context. The research model, built on the accessibility-diagnosticity model and the theories of informant-mediated communications, describes the roles of multiple WWOMS communication elements in affecting the information seeker's acceptance of WWOMS recommendations.

Summary of Findings

The results confirm the effect of the diagnosticity of product information on WWOMS recommendation acceptance. The study indicates that information seekers will assess whether product information from WWOMS is diagnostic or not before they take into account that information for making decisions. When information seekers feel that the presented product information is unable to help them accurately learn and evaluate the product, they will more likely to discount the information and reject the recommendedention. This finding is consistent with previous marketing studies (Kempt and Smith, 1998) and IS studies (Jiang and Benbasat 2005, Suh and Lee 2005), which suggest that diagnosticity assessment is an important cognitive operation that consumers engage in when processing product information.

The results further suggest that to derive information diagnosticity assessment information seekers will utilize various communication elements. The product information from WWOM is an important source the information seeker taps into to assess information diagnosticity. The information seeker will relate the provided information to personal consumption needs to determine whether the information is diagnostic and useful for evaluating the

product. The information from WWOMS will not be counted on if it does not address the product attributes that the information seeker is interested in. The decision aid indicators that reflect other consumers' evaluations on the helpfulness of the product information and recommendations are also useful for information seekers to determine whether information from WWOMS is diagnostic.

We reveal that the informant's characteristics are another type of factor affecting the acceptance of WWOMS recommendations. The study finds that informant trustworthiness determines WWOMS recommendation acceptance. Informant expertise has no significant direct effect on recommendation acceptance; its positive effect is fully mediated by informant trustworthiness. The closer relationship between WWOMS recommendation acceptance and informant trustworthiness is in line with many prior studies which suggest that trust is a central issue in e-commerce (Gefen et al. 2003, Pavlou and Gefen 2004). It adds further evidence to the argument that to be successful, e-commerce practitioners need to cultivate consumers' trust in the online environment.

WWOMS databases have the ability to store vast reviews, feedbacks, and posts submitted by consumers. This study suggests these reviews, feedbacks, and posts are an important asset for WWOMS operators. The study results demonstrate that WWOMS information seekers will base on WWOMS informant's information provision history to develop an assessment of the informant and factor that assessment into consumption decision. Specifically, if an informant has consistently provided information to WWOMS on a particular type of product, he/she will be perceived to be an expert in the product domain and a trustworthy advisor.

We failed to validate the proposed effects of status indicators on the perception of informant characteristics. The elaboration likelihood model (ELM) (Petty and Cacioppo 1986) could lend us a plausible explanation. According to ELM, individuals are more likely to focus on the essential and central information to determine whether to accept an opinion when they are highly motivated to process the information. When information processing motivation decreases, environmental cues become more important in shaping the individuals' opinion acceptance. Comparing to the web pages that reflected the informant's past information contribution, in this study, informant's status indicator was more a peripheral signaling factor. On the other hand, the subjects' information processing motivation was held relatively high to maintain their cognitive resources at the same level. Such a design may have weakened the effect of the status indicator.

Contributions and Implications

The study makes substantial theoretical contributions in the following respects. It fills the current knowledge void regarding the consumer's processing and usage of information and recommendation from WWOMS. The majority of current research on WWOM focuses on its effects on sales and trust in the online auction context (e.g., Ba and Pavlou 2003). We lack the knowledge about how consumers process product information and recommendations in WWOMS for general products. Motivated by the limitation in current WWOMS research, this study advances our knowledge about WWOMS by explicating the cognitive processes that underlie the consumer's decision making in a general WWOMS environment.

Meanwhile, the study enhances the WOM literature by contributing new insights of WWOM. WWOM is a special form of WOM and WWOMS possess features and mechanisms that are hard to implement in a WOM context. For example, thanks to interactivity capability of computer-mediated communications, WWOMS are able to obtain the consumers' responses to Web-based WOM information and provide those responses to new consumers. Also, WWOMS practitioners can deploy some system artifacts to intervene consumers' decision making. By including WWOMS system artifacts and features in the research model, our study reveals the unique operating mechanisms of WWOMS system interventions and updates our general knowledge about WOM.

The present study extends the accessibility-diagnosticity model and the theories of informant-mediated communications to WWOM research and validates their applicability. It enriches these theoretical perspectives by identifying new factors in the WWOMS context that will help individuals form assessments of information diagnosticity, informant expertise and trustworthiness. Previous IS studies found that diagnosticity could be shaped by IT-enhanced product presentation (Suh and Lee 2005, Jiang and Benbasat 2005) in a computer-mediated communication context. This study demonstrates that plain text-based product information presentation can also result in variations in diagnosticity perception. We also explicate that a WWOM informant's information provision record, a type of information unique to WWOMS, is an important resource an individual taps to generate informant assessment.

The findings from the study have many implications for WWOMS designers and operators. The study shows that information and recommendations in WWOMS must address the WWOMS information seeker's personal needs in order to be accepted. We envisage one possible approach that WWOMS operators can take to increase the fit between information presented and personal consumption needs, that is, they need to ensure that the product information submitted to WWOMS should cover product attributes as comprehensively as possible. To attain this objective, they can have a prior research of the products contained in their WWOMS to determine the important attributes of each product category from the perspective of the majority consumers. Then WWOMS can incorporate and implement some mechanisms to remind the information contributors of these attributes and instruct them to try to address every attribute in their product descriptions. Through this way, the probability of congruence between the product information in WWOMS and the information seeker's need will increase tremendously.

Consumers' evaluations of the usefulness and helpfulness of WWOMS information are found to heighten the acceptance of information and recommendations. This suggests that WWOM designers should include a system mechanism to allow WWOMS information seekers to provide feedbacks on the information and recommendations they have read and taken and present those feedbacks to new information seekers. As indicated in the study, this mechanism can significantly facilitate information seekers' assessments of the diagnosticity of the product information.

This study also has important implications for practitioners working with electronic recommendation agents. Recommendation agents, both human and electronic, have been widely adopted in electronic commerce (Jiang and Benbasat 2005, Wang and Benbasat 2005). While it has been advocated that effective product information presentation is important to enhance consumers' product learning and promote electronic transactions (Suh and Lee 2005, Jiang and Benbasat 2005), our study highlights that recommendation agent systems also need to communicate the agent's characteristics adequately. Extending the findings of this study, these systems could reveal the agent's characteristics such as her/its expertise domain, the number of recommendations made in different product categories, and the rate of successful recommendations to help the consumer decide whether to accept the agent's recommendation.

Limitation and Future Directions

One limitation of this study is the use of student subjects, which is often criticized for lack of generalizability. We acknowledge that replicating this study with subjects from other online consumer pools will strengthen the findings and increase the study's external validity.

This study was carried out with an experimental WWOMS. Although the internal validity could be enhanced due to the control of various confounding factors in such a simplified environment, external validity of our conclusions can be strengthened with real WWOMS.

The study suggests a number of future research directions. First, to isolate other confounding effects, our study focuses on positive recommendations only. Given that WWOMS could be used to outlet the dissatisfaction with a product, negative product information constitutes a significant proportion of Web-based WOM information. It is hence important to develop our knowledge on how consumers process negative product information in WWOMS and make decisions.

Additionally, products tend to receive multiple reviews in WWOMS. It is a very common challenge for the information seeker to decide her weight formula for multiple pieces of information with different need-information-congruence properties and from difference informants with varying backgrounds. Researchers could explore how information seekers deal with such complex situations and what helpful decision aids could be employed.

Future studies could also relax the study's assumption that there is no social or virtual relationship between WWOM informants and WWOM information seekers and explore WWOMS recommendation acceptance within a virtual social network. Indeed, initial attempts in this direction have been made recently (e.g., Dan-Gur and Rafaeli 2006). A possible direction that researchers could explore is what system mechanisms could be developed to help form social ties between WWOM informants and WWOM information seekers and how the ties would affect WWOMS recommendation acceptance.

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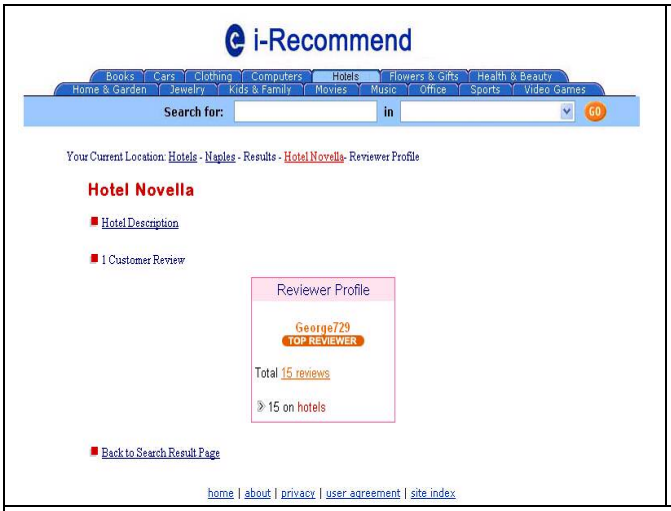
Appendix 1. The Manipulation of Need-information Congruence

Congruence	I have just returned from Naples, Italy. I stayed in the hotel Novella for 3 days during my trip to Naples. After arriving at the hotel lobby, I was approached by friendly and helpful staff who helped to create a welcoming atmosphere in the hotel. The check-in process was efficient. *The hotel is close to the subway so you can get there from the airport and train station straightway. The hotel is located in a quiet yet safe neighborhood and you don't need to worry if you come back late in the night.* Both the room and bathroom were clean. I had my breakfast in the hotel restaurant which offered a lot of choices. The food quality was quite good. I would like to recommend hotel Novella to other tourists
Incongruence	I have just returned from Naples, Italy. I stayed in the hotel Novella for 3 days during my trip to Naples. After arriving at the hotel lobby, I was approached by friendly and helpful staff who helped to create a welcoming atmosphere in the hotel. The check-in process was efficient. *The hotel was decorated in a tasteful and pleasant manner. The furniture went well with the decoration style and the materials used were of high quality. The room contained all essential amenities such as TV, minibar, fridge, hairdryer and was well maintained.* Both the room and bathroom were clean. I had my breakfast in the hotel restaurant which offered a lot of choices. The food quality was quite good. I would like to recommend hotel Novella to other tourists.

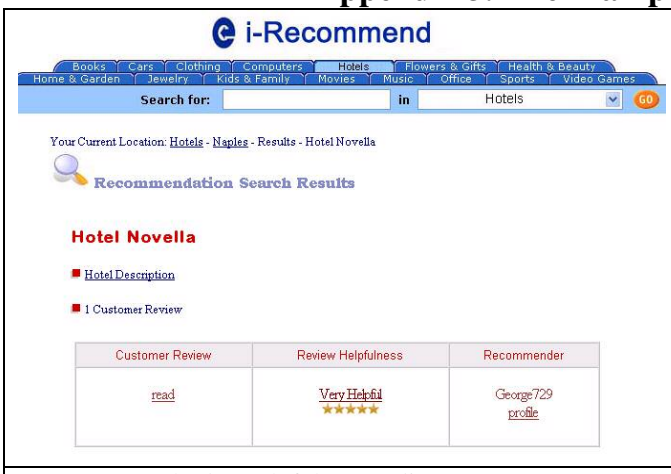
Appendix 2. The Manipulation of Information Provision History



Manipulation of Information Provision Concentration – Concentration Condition

Manipulation of Information Provision Concentration – Non-concentration Condition

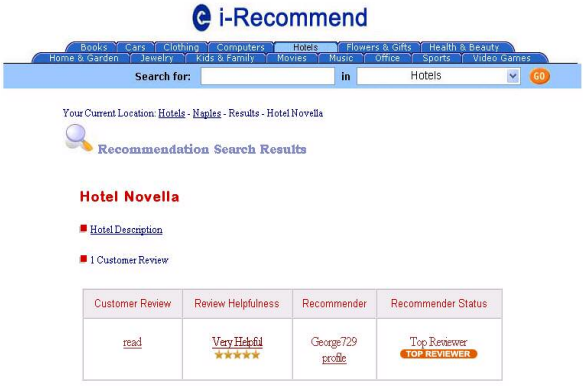
Appendix 3. The Manipulation of Indicators



Only the Helpfulness Indicator Present

Only the Status Indicator Present

No indicators Present



Both indicators Present